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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/766,466	01/27/2004	Davide Chiola	IR-2004 (2-2563)	3193
2352	7590	05/02/2005	EXAMINER	
OSTROLENK FABER GERB & SOFFEN 1180 AVENUE OF THE AMERICAS NEW YORK, NY 100368403			TRAN, THIEN F	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 05/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/766,466

Applicant(s)

CHIOLA ET AL.

Examiner

Thien F. Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 12-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

Applicant's election without traverse of Group I with claims 1-11 readable thereon in the reply filed on 02/17/2005 is acknowledged.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 5 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Murakami Susumu et al. (JP 10-117003).

Murakami Susumu et al. discloses a semiconductor device (Figures 1 and 2) comprising a substrate 3 of a first conductivity type (n-type); an epitaxial layer 1 of said first conductivity type formed over a major surface of said substrate; a plurality of regions 2 of a second conductivity type (p-type) formed in said epitaxial layer, each of said regions of said second conductivity type extending to a first depth and laterally spaced from another region of said second conductivity type by a distance selected so that said device inherently exhibits the same reverse avalanche energy absorption characteristics as a Fast Recovery Epitaxial Diode having a diffusion of a depth higher

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than said first depth; and a schottky contact layer 20 in contact with said plurality of spaced regions 2 of said second conductivity type and regions 1 of said first conductivity type disposed between said spaced regions of said second conductivity type.

Regarding claim 2, said regions 2 of said second conductivity type are stripes.

Regarding claim 5, said schottky contact layer 2 comprises aluminum.

Regarding claim 11, Murakami Susumu et al. further discloses a back contact layer 30 disposed over a second major surface of said substrate opposing said first major surface.

Claims 1, 4-5 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Akiyama Yoshito et al. (JP 03-024767).

Akiyama Yoshito et al. discloses a semiconductor device (Figure 1) comprising a substrate 11 of a first conductivity type (n-type); an epitaxial layer 12 of said first conductivity type formed over a major surface of said substrate; a plurality of regions 13 of a second conductivity type (p-type) formed in said epitaxial layer, each of said regions of said second conductivity type extending to a first depth  $d$  and laterally spaced from another region of said second conductivity type by a distance  $w_2$  selected so that said device inherently exhibits the same reverse avalanche energy absorption characteristics as a Fast Recovery Epitaxial Diode having a diffusion of a depth higher than said first depth; and a schottky contact layer 16 in contact with said plurality of spaced regions 13 of said second conductivity type and regions 12 of said first conductivity type disposed between said spaced regions of said second conductivity type.

Regarding claim 4, said regions 13 of said second conductivity type are 5 microns deep.

Regarding claim 5, said schottky contact layer 16 comprises aluminum.

Regarding claim 11, the device comprises a back contact layer 17 disposed over a second major surface of said substrate opposing said first major surface.

Claims 1, 6, 9 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Okada et al. (US Patent Application Publication US 2004/0061195).

Okada et al. discloses a semiconductor device (Figure 1B) comprising a substrate 1 of a first conductivity type (n-type); an epitaxial layer 2 of said first conductivity type formed over a major surface of said substrate; a plurality of regions 3 of a second conductivity type (p-type) formed in said epitaxial layer, each of said regions of said second conductivity type extending to a first depth d and laterally spaced from another region of said second conductivity type by a distance selected so that said device inherently exhibits the same reverse avalanche energy absorption characteristics as a Fast Recovery Epitaxial Diode having a diffusion of a depth higher than said first depth; and a schottky contact layer (6, 7) in contact with said plurality of spaced regions 3 of said second conductivity type and regions 2 of said first conductivity type disposed between said spaced regions of said second conductivity type.

Regarding claims 6, 9 and 10, said distance between a region 3 of said second conductivity type and another region 3 of said second conductivity type is 1 to 10 microns.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama Yoshito et al. (JP 03-024767) in view of Dahlqvist et al. (USPN 6,524,900).

Akiyama Yoshito et al. as described above does not explicitly disclose the regions 13 of the second conductivity type being stripes. Dahlqvist et al. discloses spaced regions 4 of the second conductivity type in the epitaxial layer 2 comprising different shapes such as stripes (Figure 7b), annular (Figure 7c) and square (Figure 7a). Therefore, it would have been obvious to form the regions 13 of the second conductivity type in the device of Akiyama Yoshito's reference having a shape of a stripe, since the specification contains no disclosure of either the critical nature of the claimed shape or any unexpected results arising therefrom. In re Daily, 93 USPQ 47 (CCPA 1966), the court held that changes in size and shape of parts of an invention in the absence of an unexpected result involves routine skill in the art.

Regarding claim 3, said regions 13 of said second conductivity type are 5 microns deep.

Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okada et al. (US Patent Application Publication US 2004/0061195).

Okada et al. as described above does not disclose the distance between a region 3 of said second conductivity type and another region 3 of said second conductivity type

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being in the claimed range (12 microns, 19 microns). It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the regions 3 spaced from one another at an interval (distance) as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. In re Daily, 93 USPQ 47 (CCPA 1966), the court held that changes in size and shape of parts of an invention in the absence of an unexpected result involves routine skill in the art. Additionally, In Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thien F. Tran whose telephone number is (571) 272-1665. The examiner can normally be reached on 8:30AM - 5:00PM Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

tt  
April 21, 2005

  
**THIEN TRAN**  
**PRIMARY EXAMINER**